PACKET STATUS REGISTER

Tucson Amateur Packet Radio Corporation
A Non-Profit Research and Development Corporation

In This Issue:

President's Corner
by John Ackermann, N8UR

We've just finished the first year of the new millenium (I'm one of the boring nerds who thinks the century began on 1/1/2001). Where is TAPR today? What have we done, and what are we doing?

The past year has seen a lot of changes in the organization. We've had some new officers and a change in our office. We've moved the Packet Status Register to its new electronic format, and we're hard at work redesigning the web site. Although there have certainly been some bumpy spots along the way, I think these transitions have generally gone well and we're settling into the new routine. I'd like to particularly thank Laura Koster and her assistant, John Koster W9DDD, for their efforts in transferring the office. It was a much bigger job than they, or anyone else, realized it would be.

Organizational matters aside, what does TAPR have to show for the year? We've made some very significant strides toward our goal of providing "enabling technology" for amateur radio operators around the world. Enabling Technology is technology

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that puts experimentation, research, and development back in the hands of hams. I often hear complaints that we can't experiment anymore because radios are too complex and assembly techniques like surface-mount components and large-scale ICs make it impossible to tinker. There's truth to this, but at the same time as hardware becomes more challenging for the home experimenter, more and more of the interesting stuff is moving into the software that runs on that hardware. And, when it comes to software, we can hold our own. One of the goals of TAPR's Enabling Technology initiative is to put hardware into your hands that provides a platform for software experimentation that can keep hams on the leading edge of technology.

Enabling Technology ranges from simple projects that can be put to multiple uses, like the PIC-E, to very complex products that allow us to experiment with new technologies like spread spectrum and Software Defined Radios.

At the simple end of the scale, a product like the PIC-E provides a platform that any ham can use to develop new applications for the APRS protocol. The PIC-E has been around for a while, so I won't spend a lot of time describing it, but it's worth pointing out again that while most of us use it as the heart of an inexpensive APRS tracker, the PIC-E's open software, easy programmability, and universal design mean that it is a great environment for learning about PIC programming, as well as a useful tool for hosting new APRS applications.

At the other end, the FHSS and DSP-10 radios represent leading edge technologies. For those of you who have been following the FHSS project for the seemingly centuries it's been in the works, there's a progress report elsewhere in this issue. Let me just say that although we wish the radio had moved along more quickly, we're still convinced that it fills a niche that commercially available SS radios don't, and that the creative work that has gone into its design will yield benefits to the ham community independently of the radio itself. As an Enabling Technology project, the FHSS radio is perhaps without peer. Although its hardware design is complex and full of surface mount components with hundreds of leads -- thus making it impractical for virtually all hams to build at home -- it's in many respects a Software Defined Radio ("SDR") and all its software will be available as open source. You'll be able to experiment with new protocols, error correction techniques, media sharing methods, etc. using this radio as a platform.

Moving from the future to the present, I'm happy to report that the DSP-10 SDR kit has been shipping since this fall, and about 70 units are in the hands of hams today. Reports we've received so far are very positive, and despite the fact that this is a complex kit that uses surface mount RF components and requires some mechanical skills, folks are successfully putting these radios on the air. The DSP-10 is a true Software Defined Radio and the code has already gone through several revisions that have improved performance and added new modes of operation. In short, the DSP-10 has already established itself as a real success.

And we're not the only one's who think so. The DSP-10 has been noticed in the non-ham electronics press, and we've gotten some great publicity that shows that hams are still dancing on the leading edge. In an in-depth review of the SDR state-of-the-art, online industry newsletter DSP InSITE (http://www.e-insite.net) noted that:

> The international amateur radio community is right at the forefront of the Software-defined radio revolution. Ham radio operators are already building and testing innovative designs that employ some of the very latest DSP and ADC technologies to hit the marketplace.

DSP inSITE went on to mention Bob Larkin, W7PUA, his articles in QST, and TAPR's marketing of the DSP-10. That's the kind of press we need much more of!

In addition to Bob Larkin, W7PUA, who designed the DSP-10 and agreed to make it available to TAPR, I'd like to thank TAPR project leader Steve Bible, N7HPR and Dan Schultz, N8FGV, Joe Borovetz, WA5VMS, and John Koster, W9DDD, for turning the DSP-10 design

into a kit with the traditional TAPR quality. This is a big kit with lots of tiny bits and pieces, and the team did a great job in finding sources for all the components, sorting all those parts into the right bins, and getting the right number of each into each kit. It was a massive undertaking.

Projects and products like the PIC-E, FHSS radio, and DSP-10 are examples of TAPR's commitment to help hams remain on the leading edge of technology. Our continued success is proof that the pioneering spirit is still alive in ham radio, and your support of TAPR helps to ensure that spirit will continue.

DCC 2001

This year's Digital Communications Conference was challenged by the events of September 11, but despite all the disruptions about 70 hams gathered near Cincinnati for a conference that could hold its own on both technical content and camaraderie. Presentations ranged from introductory sessions on digital communications modes to a tutorial on using CirCAD schematic capture. Unfortunately, quite a few folks had to cancel due to travel problems, including the speaker for our planned Sunday morning seminar, and as a result we had to cancel that event. That was a real loss, but we hope to make up for it next year.

Dr. Tony Curtis, K3RXK, was the keynote speaker at the Saturday evening banquet, and gave a spellbinding talk on the history of amateur satellite communication. He closed by polling the audience about whether hams should be looking toward an amateur installation on the moon, or on Mars! (My vote was for both.)

One of the DCC's highlights was having TenTec represented by Gary Barbour, AC4DL, and Allan Kaplan, W1AEL. Gary gave a presentation on Software Defined Radios from a manufacturer's perspective, and showed off TenTec's 526 2M/6M multimode rig, which is a true SDR with all receive and transmit signal processing handled in a DSP. TenTec clearly "gets it" and understands that SDR concepts not only offer lots of performance improvements, but also keep manufacturing costs down (when I saw the inside of the 526, I thought they hadn't finished building it --most of the box is empty space with all the components on two roomy circuit boards). TenTec has shown that SDR is a win-win situation for both manufacturers and consumers, and they're backing up their words with the recent announcement of the TenTec 516 QRP HF rig which uses the same SDR technology as the 526 (mine's already on order!).

So, despite the difficulties of last September, DCC 2001 was a resounding success. Which brings us to... DCC 2002. Next year's conference will be held in Denver, CO, on September 13-15, 2002. More information on the conference hotel and other deadlines will be presented on the TAPR web page as information is known (http://www.tapr.org/dcc).

The New PSR

This is the second issue of Packet Status Register published in electronic format. The response to our first electronic issue was generally favorable, but we've received some good suggestions. One of the most common comments is that the document is formatted for printing rather than screen display. That's true, and we hope to fix that, but the challenge is making the PSR both screen- and printer- friendly without having to lay out each issue twice. We're working on it.

A New Product Area for TAPR?

TAPR is well known for our GPS-based projects, but mainly in the context of APRS operation. You may also be aware of the TAC-2 kit which is aimed at users interested in the timing, rather than location, capabilities of GPS. Several of us have developed an interest in the world of time and frequency measurement, and there are several interesting projects in the "cocktail napkin" planning stages. Are you interested in this aspect of our hobby? If so, please let us know because we'd like your input as we think about the sorts of Enabling Technology TAPR could offer in this area.

Spam, spam, spam...

In the last months of 2001, the amount of spam hitting email accounts across the world seems to have increased by at least 10dB. The TAPR mailing lists have had their share of unwanted intrusions. There are only a couple of realistic things that mailing list operators can do to keep spam from propagating through their lists. The two most useful are to limit postings to subscribed members, and to approve subscription requests to keep spammers from signing up. Neither of these tools is without pain. Limiting postings to subscribers makes it more difficult for folks with multiple email addresses to use the lists. Approving subscription requests requires ongoing effort from a volunteer who's not likely to receive many thanks. For both these reasons, most TAPR lists (except the APRS-related groups) have not used these features.

However, the situation has reached the point where we need to act. So, by the time you read this, all TAPR mailing lists will be limited to postings by subscribers only, and on an as-needed basis we will monitor for spammer subscriptions. If the subscribers-only rule causes you problems, you should know that you can subscribe to lists under each address from which you post, and set your list options so that messages aren't set to those addresses. That way you'll be able to post from multiple accounts but will receive only one copy of list messages.

Some Final Thoughts

I'm happy with what TAPR's done in the past year. However, we can do much more. Although this is nothing new, most of our new projects come from a small group of people. We'd like to expand that pool of "doers" and invite you to bring your ideas forward. We won't design your project for you, but if you have a solid idea that's reached the point where "how do I get this into people's hands" is the burning question, we can help.

73, John N8UR

2001 ARRL and TAPR Digital Communications Conference

The 2001 ARRL and TAPR Digital Communications Conference was held this past September 21-23 in Cincinnati, Ohio. With the tragic events of September 11th, TAPR seriously considered whether it was still appropriate or feasible to hold the Digital Communications Conference. Although we grieved with the whole world for the losses so many suffered, we believed it was important to show that terrorism would not succeed in making us change our way of life. The turn out was light consdiering the difficultly in air travel and a number of the international particiapnts decided not to attend. Approximately 70 people attended the half day APRS Seminar on Friday and the Main Papers Conference on Saturday. This was less than half the normal attendance at the yearly conference.

Laura Koster, new TAPR office manager with Hank Greeb, N8XX.

The conference concluded with a banquet Saturday night with a moving speech by Tony Curtis K3RXK entitled "40 Years of Amateur Radio in Space: Where We've Been, Where We Are, Where We're Going."

The top two banquet prizes awarded:
    Kenwood TM-700A
        to Jay Craswell, W0VNE
    Ten-Tec HF/VHF SWR Bridge
    and Wattmeter Kit
        to Mel Whitten, K0PFX

Thanks a Million! to Kenwood, Ten-Tec, John Hansen, W2FS, Byon Garrabrant, N6BG, ARRL and TAPR for the donation of prizes.

Tony Curtis, K3RXK speaking at the DCC.

The proceedings while maintaining its high quality of papers was a little thin this year. The conference hopes that authors keep in mind the annual deadline in June/July for papers.

The conference team would like to thank the particiapting local organizations:

Greater Cinti Amateur Radio Assn.
DIAL Radio Club
Miami Valley FM Association
Southwest Ohio Digital Symposium

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Ron Walther, W7AI and Tim Shepard, KD1KY in the middle with other conference attendees.

Doug McKinney, KC3RL with Judith, WB3AIQ, and Tony Curtis, K3RXK

Guy Story, KC5GOI (left), Mel Whitten, K0PFX (right) at dinner.

James Davis, KT4WX, Steve Dimse, K4HG, John Hansen, W2FS , and Byon Garrabrant, N6BG.

Proceeding Abstracts

APRS in Hollywood - Integrating Real Time 3D Graphics with Wireless GPS systems

by Phil Brock, Bill Kovacs, and Darryl Smith VK2TDS

Abstract: This paper describes the integration of a real time wireless GPS/GIS system with high end real time 3D computer graphics. It describes some of the infrastructure required for such a system, and the work required for implementation.

Both Way Radio Internet Email

by John Blowsky, KB2SCS

Abstract: BWRIE is a software system that allows the user to send and receive Internet Emails via Amateur Packet Radio. BWRIE consists of two plain vanilla AX25 packet radio stations. One station runs my "Send" software the other runs my "Receive" software. The Receive station also has an Internet connection. A Full Time or Dial Up connection, either will work.

uWeatherTM – An APRS-compatible weather station
by David R. Andersen, K0RX

Abstract: In this paper, I describe an APRS-compatible, single-board weather station project that I have developed. The weather station is based on the Microchip 16F877 microcontroller. The basic weather station monitors temperature, relative humidity, and barometric pressure. These data are periodically formed into APRS weather packets sent using on-board AFSK generation. Thus, no TNC is required to transmit the weather packets over the air. In addition, the data are sent in industry-standard "datalogger" format out the serial port for use with any of several weather station monitoring programs. Future plans call for implementing the ability to upgrade the weather station by attaching an optional rain gauge and/or anemometer. Any rain gauge that emits a TTL pulse for each 0.01 inch of rain received as well as the Dallas Semiconductor 1-wire anemometer will work with mWeatherTM.

HF Digital Voice Transmission using an OFDM Modem with Space-Time Coding
by Matt Ettus, N2MJI

Abstract: The High-frequency (HF) radio channel presents a unique challenge to the modem designer. It is characterized by large delay-spreads, rapid fading, and impulse noise. Those modems which have been successful in this environment have relied heavily on time-diversity (through coding and interleaving), or very low bit rates. However, long interleaver delays are not tolerable in a two-way voice contact, and so some other means of improving reliability is necessary if digital voice traffic is to be accommodated.

This paper discusses the design of a digital voice HF modem which uses orthogonal frequency division multiplexing (OFDM), some time referred to as a "parallel-tone" modem. While OFDM provides some frequency diversity, there is not inherent time diversity. In order to make up for this, spatial diversity is used, both on the transmit and on the receive sides.

Digital Amateur TeleVision (D-ATV)
by Thomas Sailer, HB9JNX/AE4WA, Wolf-Henning Rech, DF9IC/N1EOW, Stefan Reimann, DG8FAC, Jens Geisler, DL8SDL

Abstract: In this article, we present a Digital Amateur TeleVision (D-ATV) transmission system. Its signal can be received by cheap set-top boxes available for approximately US$100. It offers a wide user-selectable trade-off between signal bandwidth and picture quality, and at 4.5 MHz

Revisiting the TNC firmware
by Joachim Elen, ON1DDS

John Ackermann, N8UR, speaking during the conference.

Abstract: This paper describes the implementation of a bridge in a TNC. By letting a TNC make the translation between AX.25 and a popular link layer protocol, countless new possibilities arise. Supporting SLIP or PPP would allow us to transparently attach our TNC to any device with a serial port, from personal computer to mobile handset. Users without specialized knowledge can start using complex network protocols like TCP/IP over radio frequencies as they do on the Internet. This way, new networking technologies can be adopted or developed by radio amateurs.

TCP/IP and radio amateurism - A UBA-RST TCP/IP TaskForce project
by Gert Leunen, ON1BLU

Abstract: Although several reports on TCP/IP projects have already been published, we felt our specific approach and vision could still figure as a contribution to the subject. The approach we will present here is one that addresses nearly all aspects of the network infrastructure (from hardware solutions, through network topology, up to services), focuses on transparency to the user and provides INTERACTION with legacy – as opposed to PORTING legacy into TCP/IP.

Past ARRL and TAPR Digital Communications Conference Proceedings

TAPR mainatins the library of Digital Communications Conference Proceedings. As printed copies of the older DCC proceedings were having to be photocopied, TAPR has moved the proceedings library to CD-ROM in Adobe format. When ordering, if you don't want to receive the proceedings, but just the CD, please indicate that when you order.

A listing of all proceeding abstracts are available on-line at http://www.tapr.org, look under the Conference link.

* CDs includes the conference proceedings saved in adobe acrobat pdf format. Text format can be searched.
* Audio and overheads from each conference are included as available.
* Audio from the conferences are presented in RealAudio format.

Proceedings 17 - 19 / 1998 - 2000

Price: $33.00 CD-ROM only.
Price: $50.00 includes available proceedings in print.

19th DCC 2000 (w/Conference Audio)
18th DCC 1999 (w/Conference Audio)
17th DCC 1998 (w/Conference Audio)

Proceedings 11-16 / 1992 - 1997

Price: $33.00 includes available proceedings in print.

16th CNC 1997 (w/Conference Audio)
15th CNC 1996 (w/Conference Audio)
14th CNC 1995
13th CNC 1994
12th CNC 1993
11th CNC 1992

Proceedings 1 - 10 / 1981 - 1991

Price: $33.00 includes available proceedings in print.

10th CNC 1991
9th CNC 1990
8th CNC 1989
7th CNC 1988
6th CNC 1987
5th CNC 1986
1st-4th CNC 1981-1985

Project Update:

W7PUA DSP-10 2 Meter Software Defined Transceiver Surface-Mount Kit

The DSP-10 was introduced as a kit in 2001. So far 100 kits have been sold with more being kitted.

About the DSP-10

The DSP-10 2-Meter Software Defined Transceiver in surface-mount kit form. The DSP-10 was featured in a three-part article in QST September, October and November 1999. Bob Larkin, W7PUA, the creator of the DSP-10 is working with TAPR to kit the DSP-10. TAPR's kitting of the DSP-10 is in keeping with its tradition as a member supported Amateur Radio Research and Development organization and supporting the development of Software Defined Radios (SDR).

The kit contains all components, PCB, and Hammond Enclosure. All that is required to complete the kit is an Analog Devices EZ-Kit Lite DSP (Analog Devices P/N ADDS-2181-EZLITE). A listing of Analog Devices Distributors is available at on the TAPR web site.

Additional information on the project can be found on the DSP-10 List. Questions about the assembly and operation of the DSP-10 are handled on the list. You can subscribe to the list via the web at http://www.qth.net. Or you can subscribe to the DSP-10 list via email:

To: majordomo@qth.net
Subject: Nothing in the subject line
Only two words in the message: subscribe dsp-10

Ordering Information

The price for the DSP-10 with PCB and Hammond Enclosure:
$259.00 US for members of TAPR
$289.00 US for non-members
    + shipping/handling

TAPR kits can be complex depending on the kitting experience of each builder. We don't think you will have trouble with the DSP-10 kit, but it does require some knowledge and experience to successfully go from a kit to a finished, usable unit, depending on the mode of operations.

Project Update:

Digital Voice

TAPR has a new Digital Voice
Web Page at http://www.tapr.org/tapr/dv/

Charles, G4GUO

The new page contains articles and information on current information regarding the Digital Voice project. Digital voice is voice (analog) communications that has been digitized (analog to digital) and transmitted digitally over radio using a modem. The receiving station receives the digital signal and converts it back to analog (digital to analog).

VOCODER Beta Kit

TAPR is working on a VOCODER Kit based on G4GUO's design. Work on the VOCODER board is progressing. The biggest hurdle is in the modem. In Charles' original design, he programmed an HF modem using the Motorola DSP56002EVM board that has since been discontinued. Work on programming another DSP platform is underway. We are looking for volunteers that can work on this aspect of the project. There are only a very limited number of beta kits available. If you are interested in becoming a beta tester, please contact N7HPR at n7hpr@tapr.org.

New Digital Voice List

There is a new TAPR list to handle the discussion on digital voice. See the TAPR home page under TAPR Lists.

Japan Packet Radio User's Group (PRUG)

PRUG gave a written report of their activities at the 2001 ARRL/TAPR DCC in Cincinnati, OH. The new Digital Voice web contains the full report (pdf 740 kb). Using technology they have developed they have conducted on air tests and have enjoyed digital voice chats at a distance of 43 km (27 miles). Both radios are compatible with Alinco's digital voice transceiver DR435 and DJ-596.

TAPR Board of Directors Meeting

September 20, 2001
Secretary: Guy Story, KC5GOI

Directors not present:
    Steve Stroh, Bob Hansen

Officers not present:
    Jim Neeley

1. Election of Officers. Doug McKinney moved to convene as a committee of the whole to conduct election of officers. Mel Whitten seconded. The motion passed unanimously. The following officers were elected by acclamation:

President: John Ackermann
Vice President: Steve Bible
Treasurer: Jim Neeley
Secretary: Guy Story

The committee of the whole adjourned and the meeting resumed.

Reports:

Secretary's Report

Guy Story read the minutes of the May Directors meeting and the on-line session from May through September 20. Steve Dimse moved to accept the report, Byon Garrabrant seconded, and the motion carried unanimously.

Treasurer's Report

The Treasurer's report was presented on Jim Neeley's behalf.

Doug McKinney moved to accept treasurer report, Steve Dimse seconded, and the motion carried unanimously.

Committee Reports and Old Business:

Membership Report.

No report given.

Marketing Report

Doug McKinney reported on the range of amateur and related publications available for publicity. Officers and Directors are urged to submit articles for publications. There was discussion of providing a TAPR presence at additional Hamfests and shows. Doug was asked to develop a list of suitable shows and to propose a policy for reimbursement of Officers and Directors who appear on TAPR's behalf at events.

Doug will finish the Project Policy document and associated forms.

Doug suggested that projects to provide experience with simple surface mount construction would be valuable as a marketing tool that would help us reach those who are afraid of new construction techniques.

Publications Report

Publications Director Bob Hansen was not present. In his absence there was a general discussion about TAPR publications, particularly whether we should focus on paper or CD distribution in the future. There was also discussion about expanded distribution channels for TAPR publications.

PSR Report

The electronic version of PSR has been well received. However, there have been some comments that the two-column layout is hard to view on the computer. The Editor will explore options for a screen-friendly version.

Office Report

The office move was more complex than expected, but operations are returning to normal and new processes and procedures are being put in place. There was discussion about whether to continue using an outside company for copying or to acquire a good copier for the office; one may be available. John K. will investigate and make a recommendation to the Board.

TAPR.org Report

John A. outlined the current status of the system and the planned upgrade. John, Guy, and new webmaster Jerry Smith, KC????? will meet with Lee in San Antonio in October to work on transition plans. One general goal is to disallow plain-text passwords for user login, probably through use of SSH. No formal motion was made, but the Directors agreed that the President should determine criteria for granting (a) shell accounts and (b) mail accounts/forwarding. It was also agreed to obtain the "tapr.net" domain and consider allowing members to have email aliases of the form callsign@tapr.net – if and only if a way can be found to automate this process to avoid increasing the workload of the system administrator. Formal Board approval will be obtained before implementing an alias service.

Project Report:

SeveralVocoder beta kits are still in stock. The EVM that Charles Brain used for the modem has been discontinued by Motorola. To make this kit viable, an alternative modem platform is needed. One possibility is the EZKit that is also used in the DSP-10.

The DSP-10 is nearing readiness. Some surface mount parts still need to be kitted. We are considering a "HOW-TO" style documentation project for the DSP-10, based on the Linux Documentation Project. This will allow specialized documents for different aspects of the project.

The Easytrak case design is ready and we are talking with vendors about enclosure fabrication. Code space in the PIC is now consumed by the incomplete list of radios currently supported. The 18F chip that Micro Chip will provide additional space to support more radios. Target completion date is Dayton 2002.

Steve B. demo'ed the Easytrak Jr., which is a dongle that fits in a DB9 hood and provides rotor control only for Yeasu 5400/5500 rotors. Steve has requested that this may become a kit or an assembled-only product (it contains small surface mount components).

Steve B. also showed off a PSK-31 "Warbler" which is not a TAPR kit but provides a good example of RF-based kits that we might consider.

Finally, Steve B. displayed the VK3GJZ audio receiver and transmitter.

There was no other old business.

New Business:

1. We need to address the model for pricing kits. Steve, John K. and John A. will work on this, with input from Greg Jones.

2. John A. described an initiative to develop digital HF radio techniques for emergency communications in the third world. The Board agreed to support discussion and possibly sponsor a project in this area.

3. The ARRL/TAPR memorandum of understanding for the DCC expires this year. The Board agreed that John A. and Steve B. should start discussions with ARRL toward a renewal. A formal motion will be made when an extension or amendment is ready for review.

Doug McKinney moved to adjourn, Steve Bible seconded, and the motion passed unanimously.

TAPR Activities at Dayton 2002

TAPR will again be at the Dayton Hanvention which is celebrating their 50th year and their 51st show on May 17 - 19, 2002. The TAPR Digital Forum will be in room #1 from 10:00am to 12:30pm on Friday (May 17). Keep an eye on the TAPR web page for details on the PacketBash and speakers closer to Dayton Hamvention.

The Totally Accurate Clock (Tac32) Software Update

Version 2.6.0, February 9, 2002
http://www.cnssys.com/Tac32/

Enhancements:
- Add an optional maximum limit for changing the system clock. The controls associated with this new functionality are in the Set PC Clock dialog box.
- Improved the display of satellite data for CMC receivers.
- Generalized the concept of primary and secondary time messages. This was originally designed for NMEA so that the ZDA message would take precedence over the RMC message when they both appeared simultaneously. The concept has been generalized and applied to both NMEA receivers and to the CNS timing receivers to allow message 113 to override message 20.

Corrections:
- Fix for CMC - Timing message 113 reports time of last fix when there are to few satellites. In this case do not use CMC113 date/time data. Also, added additional tests before using Timing message 113. Corrected a possible sharing violation in intertask message handling.

HAM RADIO 2002

Ham Radio 2002 is the largest Amateur Radio convention in Europe, nearly the size of Dayton, but with much greater diversity. About 20,000 Hams will visit the southern German town of Friedrichshafen, which is on the north shore of Lake Constance, on June 28 through 30, 2002. Over 25,000 square meters (nearly 270,000 square feet) of display space, featuring over 300 companies from 35 countries - if it exists in the Ham world, you'll find it here.

I've been to Ham Radio twice, and both times it was easily as much fun as Dayton, perhaps more so with the really wide selection of offerings. Not exactly the place to buy a big boat anchor - how do you get it home? - but absolutely the place to go if you're a Ham in Europe. It helps if you speak another language - most any will do - but English is also quite common.

If you are thinking about going, there's a lot more in the area than Ham Radio. Just across Lake Constance is Romanshorn, Switzerland. To one side is Austria, the other France, both under 2 hours away. And Germany, of course. Hotels are cheap and plentiful, since Friedrichshafen - the home of the Zeppelin - is a summertime resort town. I stayed at a nice hotel (the Krone) in Schnetzenhausen, about 5 minutes away from the conference center, for under $50 a night, and I made my reservation only 5 weeks before the show.

For more information, visit the Friedrichshafen Conference Center's web site at <http://www.messe-fn.de/fairs/ham_radio/index.php3>

Some Packet Networking Musings
Don Rotolo, N2IRZ

Recently Tadd, KA2DEW, Steve, N8GNJ and I (N2IRZ) carried on a conversation by e-mail on some networking topics. We were far from actually developing any solutions, but from these messages came a few interesting issues.

FHSS: My own experiences with simplex packet links taught me that you can't have too many transmitters on the same band at the same site, or they'll interfere and de-sense each other. However, you need to have the capability of at least 5 links from a site, or the possible network configurations are hopelessly limited. After a notice on NetSIG about the near-completion of the long-awaited TAPR FHSS radios, I got to wondering about the ability to use a number of 900 MHz radios in close proximity to each other. After all, my experience tells me they'll never work, just interfering with each other.

Steve explained a basic operation of the FHSS radio, specifically that it transmits and receives in bursts, and all the transmitters at a given site will synchronize their transmit times with each other. In other words, they are smart enough to recognize each other, and all transmit at the same time, and then all receive at the same time.

Obviously, once a site is in sync with itself, all the sites that it can talk to must also synch up with that site, otherwise they'll be transmitting when they should be listening, right? The logical conclusion is that, eventually, all the sites in a network segment - those which use the FHSS radio as links - will all synch up with each other, using the same timing at each site.

Then came the dilemma. Let's say there are two sites, A and B, which are linked with FHSS radios. When A transmits, B listens and vice versa. A distant site X, which only links to B, will also sync up and transmit when B is listening. B transmits, A and X listen, and vice-versa. OK so far? Good.

Now, add in site C, which links to both sites A and B. When A transmits, does C listen to A or transmit to B? There's the dilemma.

Because we're discussing Amateur networks, we must assume that links will be saturated, that is, carrying as much information as the link can carry. If the links from C to both A and B are saturated, which is not unthinkable, what happens? Will throughput be cut in half on both links? Such a drastic reduction in link capacity each time the network saturates would result in perceived network instability which would render it nearly unusable unless complex bandwidth oversight existed. .

I'm not sure exactly what will happen. Perhaps all this will be resolved once other bands become available for the FHSS. But, in the meantime, I'd like to hear from anyone who can correct my probably wrong reasoning.

NETWORKING: After bouncing this issue back and forth a few times, we got onto the topic of what it is we really need when it comes to a packet network. We decided that there are a few features any Amateur Radio network should possess, in order to be justifiable, attract support to be self-sustaining, and remain useful.

1. An Amateur Packet Network should be somewhat like the Internet, in that a variety of data types can be carried independent of the network. Standards should be used where possible, to avoid having to reinvent the wheel.

2. The Network should be independent of commercial communications systems. When all else fails, the network should still function. Relying upon commercial bandwidth is a wretched crutch which destroys the integrity of networks and kills support. (I would be happy to cite a number of examples where this has happened)

3. The network should be potentially capable of operation for 24 hours or more when commercial power sources have failed. During a crisis, it should be operable by Ham-operated power plants such as automobiles. This is because the single greatest function a packet network can have is to provide reliable tactical data services over a wide geographic area in an emergency.

4. It should be usable for keyboard to keyboard communications by any Amateur Radio operator using no more than about $200 worth of gear in addition to what most hams already have (i.e. PCs and FM rigs). (This can be a bit more if necessary). Most hams won't participate if it's expensive.

5. It should be capable of being assembled, configured and operated by a high school graduate with a General class license. If you need a BSCE just to understand how it works, then it will be difficult to gather widespread and sustainable support.

6. It needs to be fun enough to use and obvious enough in it's operation, so that our hypothetical HS grad will be interested in getting involved. We have all played with 1200 baud networks, and have come to the conclusion that it just isn't fun anymore. There's little to do, and what there is, is nearly useless. DXClusters and APRS are too specialized., BBSs have lost their magic, How much time can you spend on a Chat node, and so on. In my opinion, a reasonably fast (~ISDN rate) network leaves a lot of other possibilities open.

7. A node site must be able to be constructed for about the price of a good HF rig. This hardware should be able to serve at least a couple of dozen users doing whatever activity solves #6.

8. The network should have a congestion curve such that it's imminent failure-by-overload is detectable by the users before it happens, or it should be graceful, i.e. gets slower and slower and then stops. The system we had in the 80s and still have in most places fails catastrophically when the load reaches some threshold rather than failing gracefully.

9. The network should have a routing capacity and latency tolerance such that linking the entire continental US is practical. Note that this does not imply that a national network is desired, it is just not precluded by the routing and latency tolerance issues.

10. The network should be linkable to commercial networks, but only by means that are obvious to the ham users and that prevent non-authorized users or traffic from 'leaking' into the network. This feature should be activated in much the same way a phone patch is activated, i.e. as a service of a site, rather than as a network routable link. Connections would only be made to ham radio or emergency equipment that was off-network. This capability would greatly enhance the network's utility in time of crisis. However, please re-read #2 above.

11. The network should be constructed using our best practices. For example, dedicated point-to-point links are highly preferred over wide coverage shared channels. Redundancy is valued, not just in equipment but in links as well. Wire-based network mentality must be tempered with wireless reality. A big repeater in the middle of a bunch of users is NOT a network, it's a good digipeater. Think routers, not hubs. Avoid hidden transmitter syndrome. And so on.

   While these requirements are not meant to be all-encompassing, they are a fairly good start at a robust, interesting, fun and (most importantly) sustainable network. What do you think?

   Don, N2IRZ

APRS in the Sydney 2000 Olympics
Darryl Smith, VK2DTS

Reprinted with premissiond from:
http://www.radio-active.net.au/web/consult/projects/oly2000/rcaprs.html

   I cannot remember exactly when it was, but I remember the day well… I was at work early making sure that everything was operating properly, and my cellphone rings. Caller ID says phone number is not available, which is unusual, but not too so. Answering the phone the guy on the other end said he was calling from the USA, and asked if I wanted to work on the Olympics, doing APRS?

   The guy on the phone was a Ham from central Pensylvania, and worked for Winemiller Communications who I found out later was the principal RF contractor for the Sydney Olympic Broadcasting Organisation. I aggreed to get whatever maps I had available together and copied to CD-ROM for Jeff Winemiller when he visited Sydney a few weeks later. This article is all about what happened next….

Overview

Sydney has a very poor RF environment – there are no great tall buildings that you can see from everywhere to point a microwave receiver at. From most parts of Sydney you cannot see the CBD nor the mountains to the west from ground level. This causes lots of problems if you need to get video signals from street level back to a control room. Although the AMP tower (Centerpoint) looks tall from inner Sydney, when you go move towards Olympic Park, it disappears.

For an event such as the marathon, you could always use cables, but can you imagine laying the video cables for the entire 42 Km of the Marathon? This left one option, wireless video cameras with some sort of a repeater system to get the microwave signals out to the rest of the world.

It would have been possible to put cranes up throughout the city with microwave receivers but this would not have looked very good. It also assumed that there would be line of site to the crane which would not have been possible all the time.

So the only way to get line of site for the microwave signal was to have a repeater that somehow followed camera vehicles as they went along the course. The only solution that worked technically was to have helicopters follow the vehicles as they followed the course.

Three motorcycles and a lead vehicle providing live video and audio from the course. With microwave antennas pointed straight up from ground level, a helicopter would need to be well under one KM from the vehicle it was receiving in order to get a decent signal.

But there is no way that you could keep the four vehicles so close together during a race so having a single helicopter was not really an option. There was also the problem of signals potentially interfereing with each other in the receiver, and also what happens when the helicopter needs to refuel.

More than one helicopter was needed, but how many more? It turned out that the best solution was to have a helicopter assigned to each vehicle. That way when a helicopter needed to refuel two vehicles would need to stay close together, sharing the one helicopter until the other one returned.

Big changes in aprs.net and findu.com
Steve Dimse, K4HG

The APRS server at the Miami Museum of Science had to be removed on Tuesday Feb 12, 2002. My friend (KD4DDO) was laid off after 20 years there, and with the current paranoid attitude of society, they are not willing to have a server behind their firewall without an employee that is responsible for it. At this point, the main function this machine served was as a backup to findu.com. With its less than state-of-the-art hardware, it couldn't really handle the full load anyway.

The primary findu server is also at risk, the DSL connection is again being threatened, and if I lose that connection, then findu will be off the net.

My time is very limited these days, but I am willing to provide support for two people to set up findu style servers for backup, I'll provide all the code I use and will be available to answer questions. If you wish to do this, you must meet the following requirements:

Hardware:

You will need a high-end linux server to dedicate to the task, I prefer dual P-III of at least 1 GHz, though I suppose a single 2+ GHz might be adequate. (dual P-III 600 MHz is what the backup runs, and it is not adequate). At least 1GB of RAM, this is essential for disk caching, which is important for speed. Absolutely essential is a dual SCSI hard drive, one for the system files, the other for the database. The system drive need not be big (but must be a separate drive), the database drive needs to be at least 36 GB. IDE will simply not work in this application.

A new server like this from Dell is about $3.5k plus shipping and tax (which is about what I paid for the current primary and the secondary which was the original primary).

You need a solid UPS capable of powering the system through any reasonable outage, preferably with an automatic shutdown mechanism before the UPS dies, as it takes as much as a day for the database files to be rebuilt if they are corrupted by a power outage, and they usually are.

Bandwith requirements are not high, the full findu site averages less than 2 KB/sec, though peak levels are higher, my DSL line (256 kb uplink) handles it easily.

Experience:

Setting this up requires extensive knowledge of the Linux operating system, which you must already have, or be willing to acquire on your own, I cannot teach Linux internals to you. You will be up to your elbows in the Apache configuration, mySQL administration, and cron task management. You will also need to know how to configure and maintain aprsd.

Time:

When findu suffered a hard disk crash, it took 2 days of conentrated effort to download, compile, install, and configure the pieces. A couple weeks of tweaks followed before everything was back at baseline. It will likely take you longer starting from scratch.

On an ongoing basis, I spend perhaps 10 hours a week on the server, making sure all the latest patches are installed, watching for intrusions, maintaining the database, and tweaking the system. Figure on spending even more time initially as you learn the ropes.

Programming skill:

To set up the server, you really won't need any programming skill, but if you want to tweak things, you'll need Perl and mySQL skills.

As you can see, this is a very significant committment. If you think you meet these requirements and are willing, please contact me (k4hg@tapr.org). If I get more than two applicants I'll evaluate the qualifications and pick the best two. If I get none, then we will all have to live with risk that findu could disappear at any time.

Since the hardware is the stumbling block, and no one is willing to shoulder the full cost of the server as I have done in the past (the 4 machines that have served as www.aprs.net and www.findu.com were all bought new for the purpose, and cost a total of over $12,000), this might be a good time for someone to step forward to organize a fund-raising effort to buy the needed hardware. Over the years I've had lots of offers to donate money to help my efforts, all of which I refused. If someone were collect pledges, a suitable machine could be purchased, though I do not have time to organize this effort myself. I hope someone does...and I'll pledge the first $100.

I just want this to be perfectly clear. This is not money for me, or a server for me. I do not need the money, if I wanted another server I would buy one. I no longer have the time to run two servers, and I think it is time the APRS community pulled together on something like this. I am not organizing it, I am not setting the server up, I am not maintaining it. You guys need to set this up yourselves.

I'll provide support for whoever is going to run it, and of course I'll do the name service in the findu domain for it.

But please, everyone be clear, I'll not be coming anywhere near this money or the server.

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findU wins EarthLink AVL Developers Contest

Steve Dimse, K4HG, was notified on February 13th, 2002 that findU had been designated the winner of the "Overall Favorite Application" category in the EarthLink AVL Developer Contest, the top prize!

Details of the contest are at:
http://www.research.earthlink.net/avl/contest.html
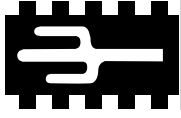
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Membership	Price	Number of Years	Total
United States	$20.00		
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Kits	Price	Qty	Total	Kit Code	Information
PIC-E(ncoder)	$65.00			16	
CompactFlash Card Adapter	$59.00			16	A FlashCard is not included in the kit
Motorola EVM56002 Interface	$150.00			16	http://www.tapr.org/tapr/html/dsp56002evm.html
APRS T-238 Weather Station	$134.00			16	
TAC-2 (Totally Accurate Clock)	$139.00			16	Requires a GPS to operate
Differential GPS (Member Price)	$199.00			16	Requires a GPS to operate
DAS (DTMF Accessory Squelch)	$68.00			8	As seen in Dec 95 QST
TAPR 9600 bps Modem	$80.00			8	
Bit Regenerator	$10.00			1	used for regenerative repeater operation
Clock Option	$5.00			1	used for regenerative repeater operation
PK-232 Modem Disconnect	$20.00			2	simplifies connection of external modems
PK232MBX Installation Kit	$20.00			2	for installation of 9600 modem in PK-232MBX
XR2211 DCD Mod.	$20.00			2	
State Machine DCD Mod.	$20.00			2	
State Machine DCD w/Int Clock	$25.00			2	For KPC2 or other TNC w/o 16X or 32X int clock
Firmware					
32K RAM w/ TNC2 update docs	$20.00			2	
TNC-2 1.1.9 w/KISS EPROM	$15.00			4	includes 1.1.9 Commands booklet (below)
1.1.9 Commands Booklet (only)	$8.00			2	full TNC-2 command set for 1.1.9
TNC-2 WA8DED EPROM	$12.00			2	8 connect version for ARES/Data standard
TNC-1 WA8DED EPROM	$12.00			2	
TNC-2 KISS EPROM	$12.00			2	
TNC-1 KISS EPROM	$12.00			2	
PK-87 WA8DED EPROM	$12.00			2	
TrackBox	$15.00			2	
Publications					
ARRL/TAPR DCC 17-19/98-2000 CD	$50.00			4	CD w/ 98 and 2000 Proceedings
ARRL/TAPR DCC 17-19/98-2000 CD	$33.00			4	CD only
ARRL/TAPR DCC 11-16/92-97 CD	$33.00			4	CD with available Proceedings
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TAPR Spread Spectrum Update	$18.00			16	200+ pages on ARS Spread Spectrum Topics
TAPR Software Library	$20.00			4	ISO 9660, 650 Megs of info! w/ html nav pages
Wireless Digital Communications	$39.99			28	300+ pages w/disk by: Tom McDermott, N5EG
Packet Radio: What? Why? How?	$12.00			8	130 pages. TAPR's Packet Radio book.
BBS Sysop Guide	$9.00			4	60 pages. by: Barry Buelow, WA0RJT
TAPR's 94 Annual Proceedings	$7.00			4	Papers from the Annual Meeting (Tucson)
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PSR Set Vol 4 (#53 - #68 '94 - '97)	$35.00			16	
ARRL/TAPR 2001 DCC	$10.00			8	2001 DCC
ARRL/TAPR 2000 DCC	$15.00			8	2000 DCC Orlando, FL
ARRL/TAPR 1999 DCC	$15.00			8	1999 DCC Proceedings Pheonix, AZ
Other					
TAPR 11oz Coffee Mug logo	$11.00			4	Logo in black and microwavable gold
TAPR Badge	$10.00			0	include Name and Call for badge
TAPR Shirt - 4 styles					http://www.tapr.org/tapr/html/shirts.html
GPS					
TAC-32 Software Registration	$55.00			0	
Garmin GPS-25	$150.00			28	(data cable included)
Garmin GPS-20/25 Interface/Power Kit	$40.00			8	No Discount.
Garmin GPS-20/GPS-25 Data Cable	$15.00			2	
Garmin GA-27 GPS Antenna	$75.00			8	mcx connector, mag and sunction mounts
Oncore UT+ GPS	$169.00			28	
Oncore VP Interface/Power Kit	$40.00			8	
Oncore GT+ GPS	$149.00			28	
Motorola Antenna 97	$65.00			8	bnc connector, mag mount
MCX Rt-Ang Connector w/coax pigtail	$15.00			2	No Discount.
Subtotal:				**Added Total Kit Codes**	

SubTotal

Membership 10% Discount (Subtotal minus discount)
Member #: _____ (Place new if joining)

Except were noted

Total Sales (Subtotal minus discount)

Texas Residents (8.25% tax)

Membership (New or Renewal)

Shipping and Handling
For Total Kit Codes Between

1 - 7	8 - 15	16 - 27	28 - 55
Add $6	Add $7	Add $8	Add $9

Kit Codes above 55 or International orders must contact TAPR for amount.

TOTAL Order Amount

☐ Charge my credit card (check one):
☐ VISA ☐ MasterCard

MasterCard   VISA

Acct. # _____
Expiration Date: _____
Signature on card: _____

Name / Call: _____
Street Address: _____
City / State / Zip: _____
Country: _____   Phone Number: _____
Internet E-mail: _____

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